

Case Study

School uses solar thermal to transform its kitchen operations

Background

The Girivanvasi Educational Trust (GVET) operates the Nareshwadi Learning Centre (NLC), an educational facility for children from the local tribal communities, at Dahanu, near Mumbai. Almost 750 students attend the school, of which 450 children board on campus. NLC's kitchen uses wood stoves, and in the past has used LPG as fuel. NLC's forward-thinking management wished to improve the working conditions for the women staff who operated the kitchen. Due to its location, the school also faced some issues with fuel availability.

Challenges

Nareshwadi Learning Centre (NLC) sought a cooking solution to prepare about 1200 meals/day during the school year. Power supply to NLC is inconsistent with significant periods of low voltage. The tribal women, who operate the existing kitchen, would operate the new kitchen too. There was some flexibility to modify the cooking schedule while adhering to the lunch and dinner schedule.



Solution

After understanding the requirements and the constraints, the A.T.E. team identified that majority of the cooking involved boiling processes. A.T.E. designed a solar thermal-based steam cooking solution that integrated energy efficiency practices. The two-axes tracking solar concentrator and balance of plant incorporates several features such as a battery-based back up system to operate the system, an easy-to-use user interface, and insulated hot water storage. A wood-fired boiler permits operation during non-solar hours and monsoon season.

Results

The solar steam-based cooking system was commissioned at the Nareshwadi Learning Centre in September 2014. This solution efficiently meets the total boiling cooking load of approximately 105 kg rice, 24 kg lentils and 33 kg vegetables. Using this solution has reduced the kitchen operation time from about 9 hours/day to about 5.5 hours/day. The hot water additionally generated is used to clean the kitchen. The solar thermal-based steam cooking system saves about 220 kg / day of wood. The consequent smoke-free environment and ergonomic design of kitchen have and reduced manual effort required and simplified the kitchen operations.



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